

Acute Kidney Injury During Pregnancy

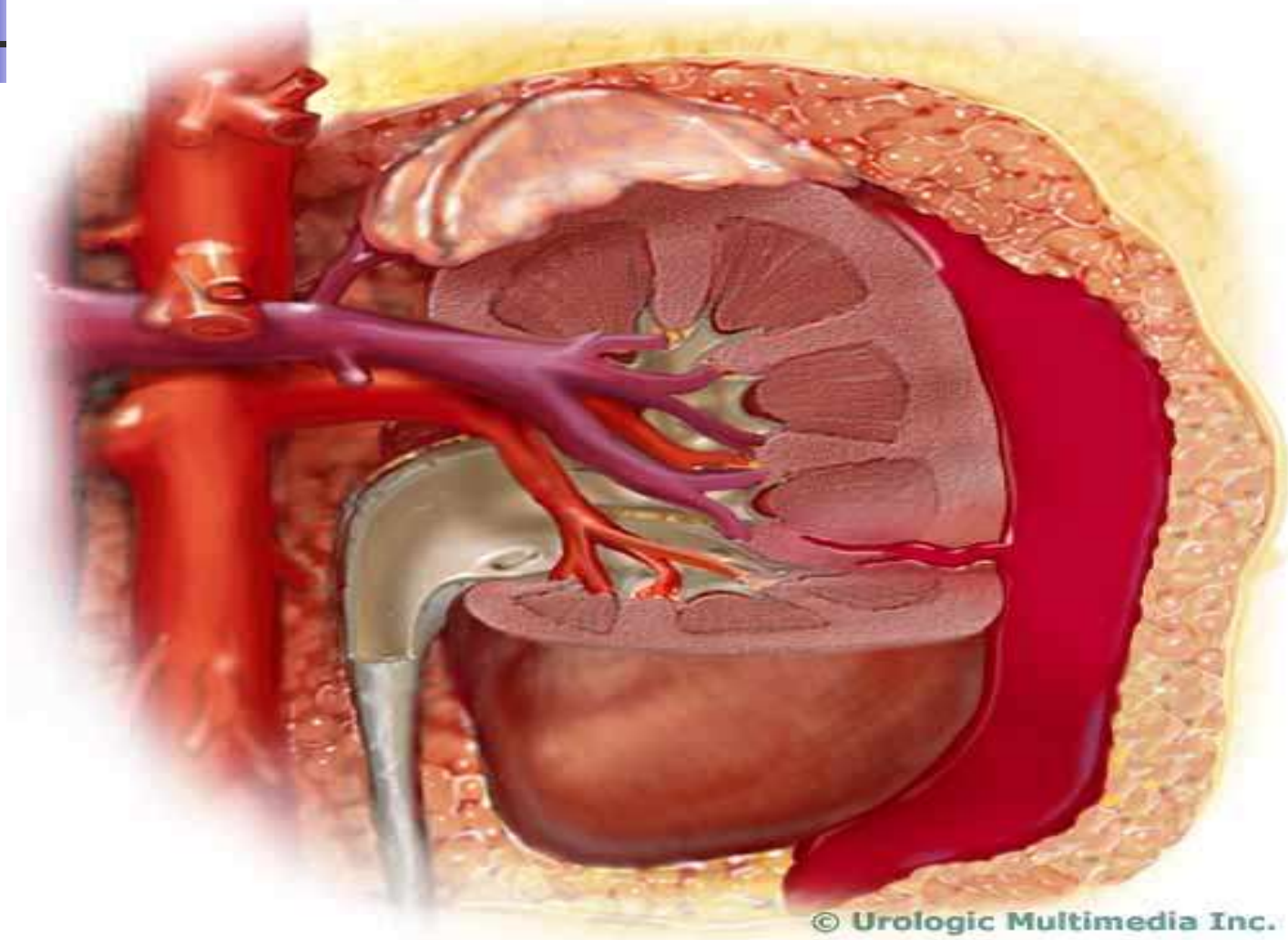
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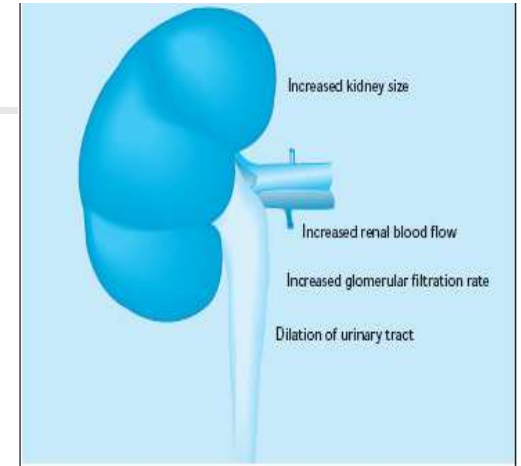


Pre-renal, renal and post-renal

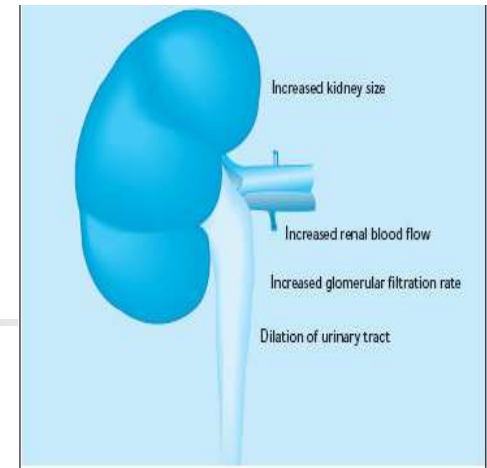


Acute Kidney Injury (AKI) in Pregnancy

- Case study,
- Physiological changes,
- Incidence,
- Causes (in early and in late pregnancy)
- Pathology
- C/P, Investigations and Management.

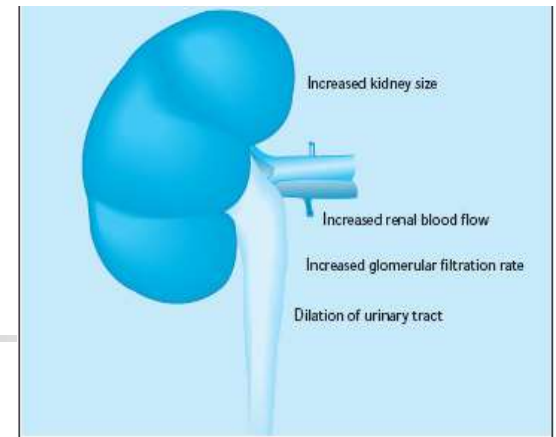


Case study



- Primigravida,
- Pregnancy progressing well till 27 weeks,
- **At 27 weeks: PIH: BP 140/90 mmHg,**
proteinuria negative.

At 28 weeks



- BP 150/100 mmHg, trace of proteinuria,
- Started Aldomet 250 mg BD,
- Normal amount of amniotic fluid and normal fetal growth.



At 29 weeks

- BP 160/110 mmHg, proteinuria ++
- Aldomet increased to 250 mg TDS,
- Slight reduction of AFI.



At 30 weeks,

- BP 180/120 mmHg, proteinuria +++,
- Epilat sublingual and oral
- Severe headache, Epigastric pain,
- HELLP syndrome (liver enzymes > 100, platelet count < 50 000).
- Serum creatinine 1.2 mg%



Refereed to MUH

- Started MgSO₄ for 6 hours,
- CS, live born baby 850 gm,
- Continued on MgSO₄ and antihypertensives,



2 nd day postpartum

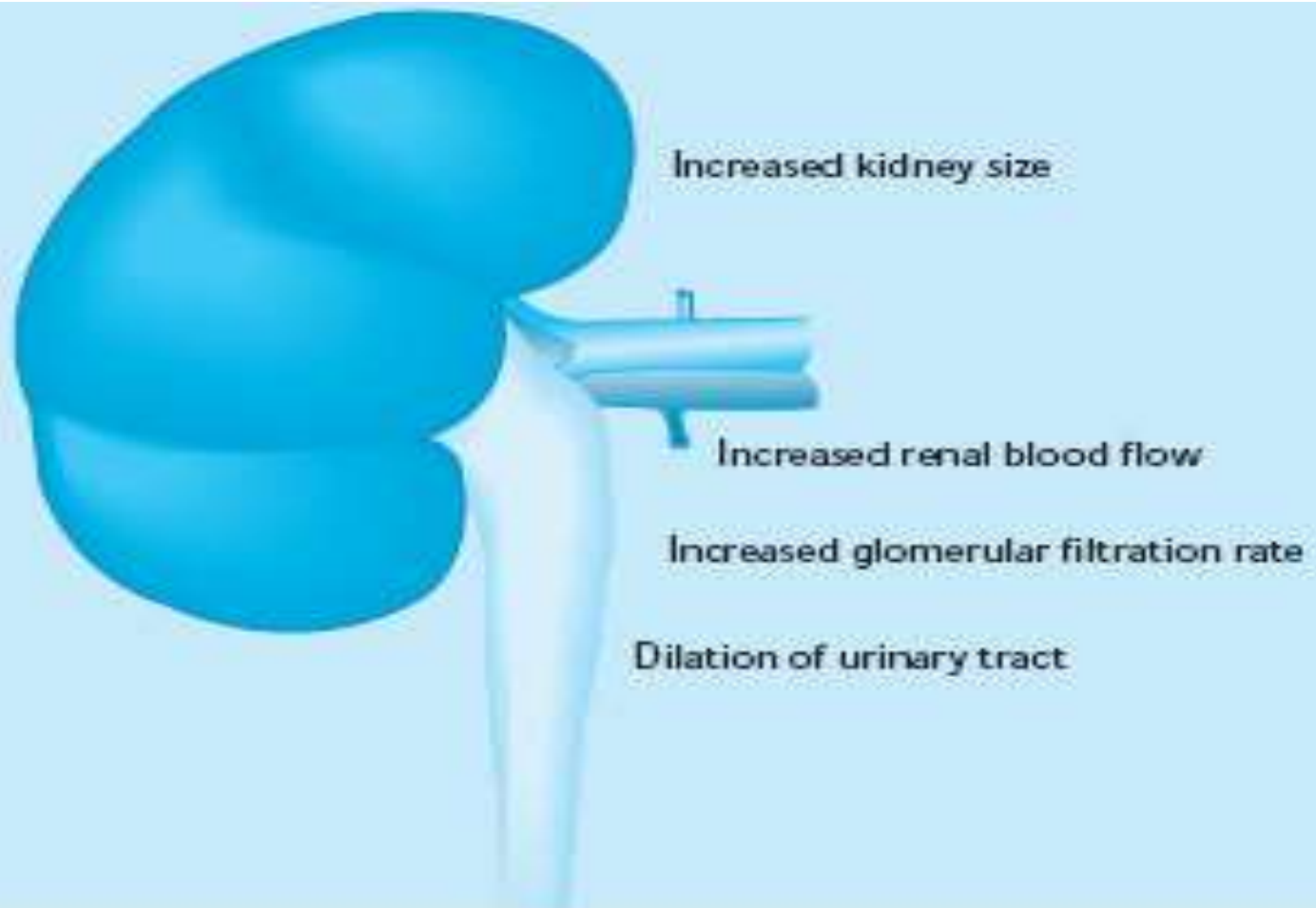
- Developed hematuria, oliguria and loin pain,
- Platelet count $<40\ 000$
- Serum creatinine $>3\text{mg}\%$
- Admitted to the ICU,



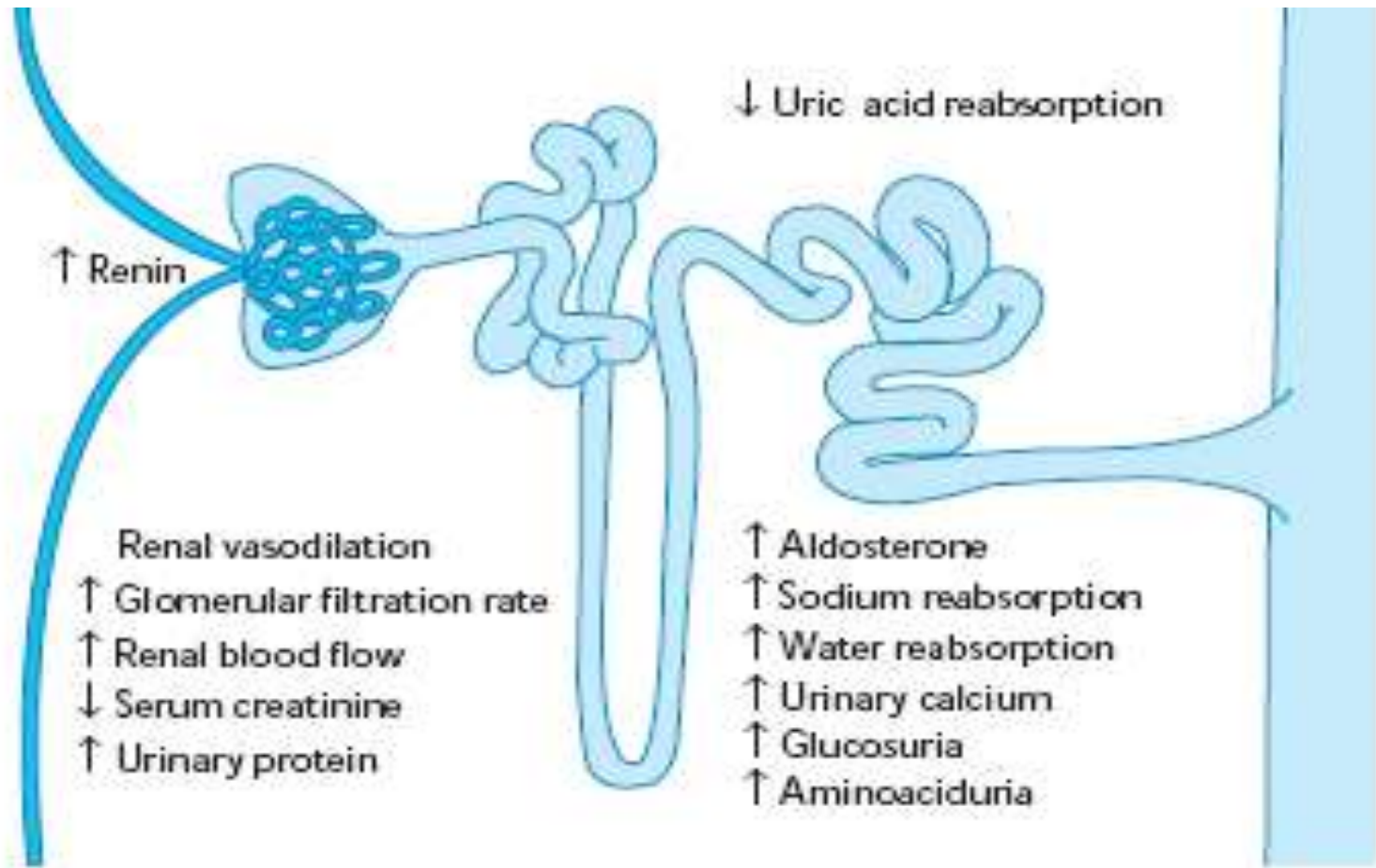
3rd-5th day postpartum.

- Gradual improvement over few days.
- Platelet count increased gradually,
- Liver enzymes decreased gradually,
- Creatinine decreased to normal.
- Discharged home on day 5.

Physiological changes during pregnancy



Physiological changes during pregnancy





Incidence

- Acute kidney injury is a life threatening complication of pregnancy.
- In developed countries, the incidence of AKI has sharply declined from 1 per 10 000 pregnancies to 1 in 20,000 births.

Beaufils MB. Pregnancy. In: Davidson AM, Cameron JS, Grunfeld JP, et al., editors. (2005) Clinical nephrology. 3rd ed. New York: Oxford University Press; pp. 1704–28.



Incidence

- In developing countries, pregnancy is still responsible for **15–20% of AKI.**

Naqvi R, Akthar F, Ahmad E, Shaikh R, Ahmed Z, Naqvi A, et al. (1996) Acute renal failure of obstetrical origin during 1994 at one centre. Ren Fail.;18:681–3



Causes of acute renal failure in pregnancy

Causes in Early pregnancy:

- Hyperemesis gravidarum causing hypovolaemia salt and electrolyte disturbances,
- Septic abortion causing septicemia.



Causes of acute renal failure in pregnancy

Causes in late pregnancy:

Preeclampsia and its complications (HELLP syndrome and DIC),

- The most common cause,
- Vaso-spasm leading to hypertension,
- BP >160/110 with proteinuria.

Causes in late pregnancy



Massive Obstetric Hemorrhage:

- Post partum,
- Antepartum (Pl Pr. and **Pl abruptio**),
- Ectopic pregnancy,
- Vesicular mole and Choriocarcinoma.



Causes in late pregnancy

Septicemia

- Puerperal Sepsis,
- Chorio-amnionitis due to prolonged PROM,
- Acute Pyelonephritis,



Causes in late pregnancy

Microangiopathies:

- Hemolytic uremic syndrome (HUS),
- Thrombotic thrombocytopenic purpura (TTP)



Causes in late pregnancy

Rare Obstetric causes:

- Urinary tract obstruction by a gravid uterus (rare),
- SLE and antiphospholipid antibody syndrome (APS),
- Acute fatty liver of pregnancy,
- Amniotic fluid embolism.



Causes in late pregnancy

Miscellaneous causes:

- Acute gastroenteritis,
- Intoxication by drugs and,
- Other causes of AKI as in non-pregnant states.



C/P

- Manifestations of the underlying cause,
- Manifestations of AKI,
- Manifestations of systemic effects.



Thrombotic- thrombocytopenic purpura

The TTP is characterized by the **pentad** of:

microangiopathic hemolytic anemia,

thrombocytopenia,

renal insufficiency,

fever, and

neurologic abnormalities due to thrombosis.



Hemolytic-uremic syndrome :

- The HUS may follow a normal pregnancy or be preceded by findings indistinguishable from **preeclampsia**.
- **Haemolysis,**
- **Renal insufficiency.**



Acute Fatty Liver of Pregnancy:

- Rare complication of pregnancy that is associated with AKI in up to 60% of cases.
- The diagnosis should be suspected in a woman with **preeclampsia** who has:
- **Hypoglycemia,**
- Hypofibrinogenemia,
- Prolonged PTT in the absence of abruptio placentae.
- Jaundice and elevated liver enzymes.



Pathology

1- Glomerular endotheliosis

- It is the typical finding in PIH.
- Glomeruli look enlarged and the endothelial cells are swollen.
- It resolves by the end of post partum period.



Pathology

2- Acute tubular necrosis

- May be seen in cases of ischemic or toxic insult.



Pathology

3- Acute interstitial nephritis

Commonly due to infection or drug.



Pathology

4- Cortical necrosis:

50% of all cortical necrosis is due to pregnancy related causes.

Commoner in post partum than antepartum AKI.



Pathology

Cortical necrosis:

- May be patchy or total.
- The triad of anuria, gross hematuria, and flank pain is seen in cortical necrosis.



Cortical necrosis:

- The diagnosis can be established by ultrasonography which shows a **subcapsular hypoechoic band.**
- Renal biopsy or arteriography also can be performed, but these invasive procedures are not required in most cases.



Treatment of AKI during pregnancy

- Multidisciplinary team management.
- Treatment of the underlying cause.



Treatment of AKI during pregnancy

- Termination of pregnancy is usually indicated if pathology persists.
- Many patients require dialysis,
- Prognosis is usually excellent.



Thank you

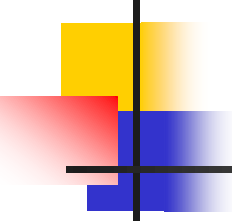


Pregnancy in patients with renal failure

Lancet, 1975.



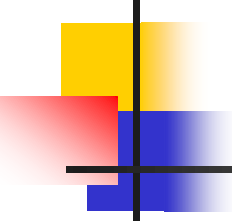
- Children of women with renal disease used to be born in a **dangerous** situation **or not at all**.
- Not at all if their doctors **do not know** their way.



Obstet Gynecol Clin North Am.

2010 Jun;37(2):195-210

- Although renal disease in pregnancy is uncommon, it poses considerable risk to maternal and fetal health.
- Podymow T, August P, Akbari A. **Management of renal disease in pregnancy.**



Saudi J Kidney Dis Transpl.

2010 Jul;21(4):646-51.

- Successful pregnancy outcome is an uncommon occurrence in women requiring chronic dialysis treatment.
- **Bahadi A** et al. Pregnancy during hemodialysis: a single center experience.



Case study

- 20-year old lady.
- Recently married.
- Chronic renal failure (lupus nephritis) on haemodialysis.
- On the waiting list for renal transplant.



Case study

- One missed period.
- Positive pregnancy test.
- TVS: intrauterine pregnancy 7 weeks.



Case study

First visit

- BP 140/90 mmHg.
- Hb 9.5 gm%.
- Counseled regarding risks of miscarriage, IUFD, IUGR, severe PIH, etc.
- Patient was happy to carry on with pregnancy.



Management during pregnancy

- Joint management with nephrology center.
- Increased frequency of HD to 20 h/w
- Replaced ACE inhibitor by Aldomet.
- BP around 140/90 mmHg.
- Cortico-steroids and Iron therapy.



Antenatal visits till 24 weeks

- Normal fetal growth.
- Normal amount of liquor.
- BP under control (around 140/90 mmHg).
- Hb 9-10 gm%.

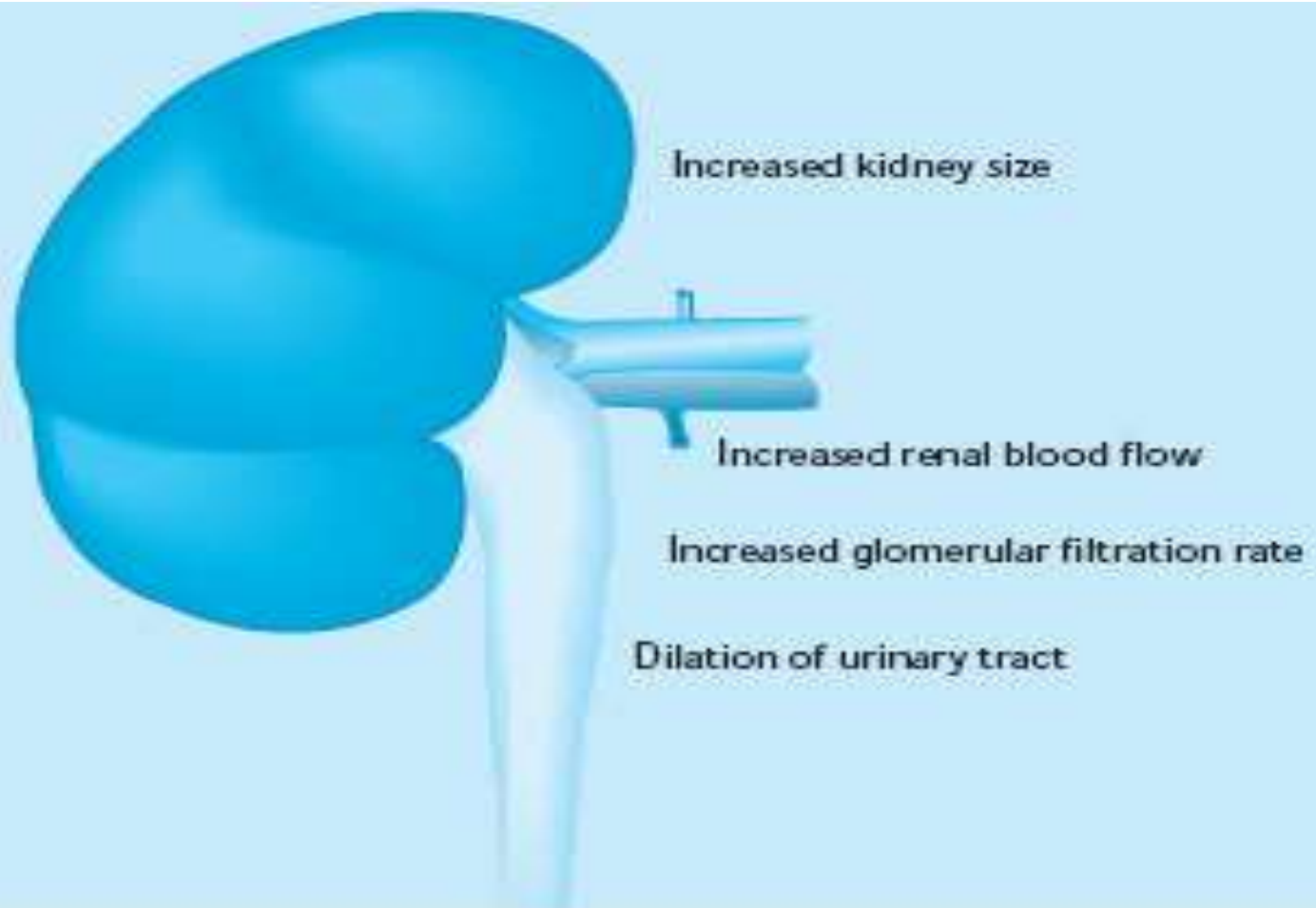


At 24 weeks

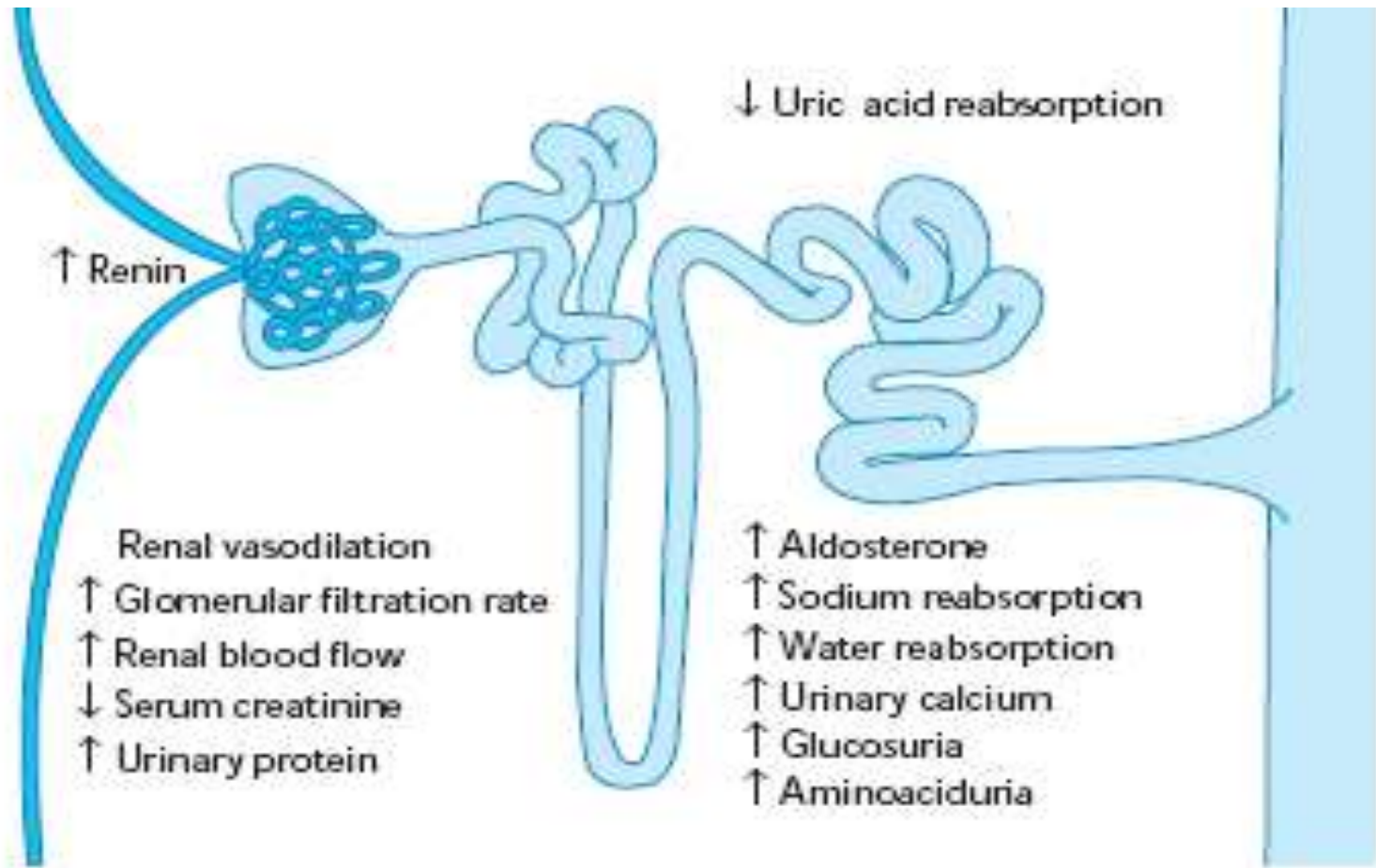
Sudden onset of:

- Recurrent labour pains--→hospitalized,
- Sudden rupture of membranes--→
- Delivery of a live born baby 600 gram.
- Early neonatal death.

Physiological changes during pregnancy



Physiological changes during pregnancy





Questions

- What are the chances of pregnancy in women on dialysis?
- Should a woman on dialysis become pregnant ?
- What are the complications of ESRD on pregnancy?
- How to manage pregnant women while on dialysis?

What are the chances of pregnancy in women on dialysis?



- Fertility is significantly reduced in women with ESRD.
- Only 42 percent of women of childbearing age on dialysis have regular menstrual periods.
- Fertility in women on HD is about 0.5 percent per year.
- Only one in 200 women of childbearing age on HD gets pregnant annually.



Should a woman on dialysis become pregnant ?

- The chances of having or losing the baby are, at best, 50:50.
- Only two-thirds of pregnancies continue beyond three months.
- 21 percent end in spontaneous abortion while 8 percent go on to stillbirth.



Any good chances?

Chances of a successful pregnancy are significantly higher in women who:

- 1- Have some renal function while on dialysis
- 2- When pregnancy occur before dialysis started.



What are the complications of ESRD on pregnancy?

- Pre-eclampsia occurs or worsens in 80 % of pregnant women on dialysis.
- Eclampsia.
- Placental abruption.
- Strokes and retinal detachment.
- Anemia and infection.



Fetal complications

- Prematurity and complications of prematurity.
- 85% of babies are born prematurely (<37w).
- 25% of them are severely premature (<28w).
- 28 % are small for gestational age (IUGR).
- 18 % of live born babies die in first week (END).



Fetal complications

Out of those who survive:

- 10 % have congenital abnormalities.
- 20 % have long term medical problems.

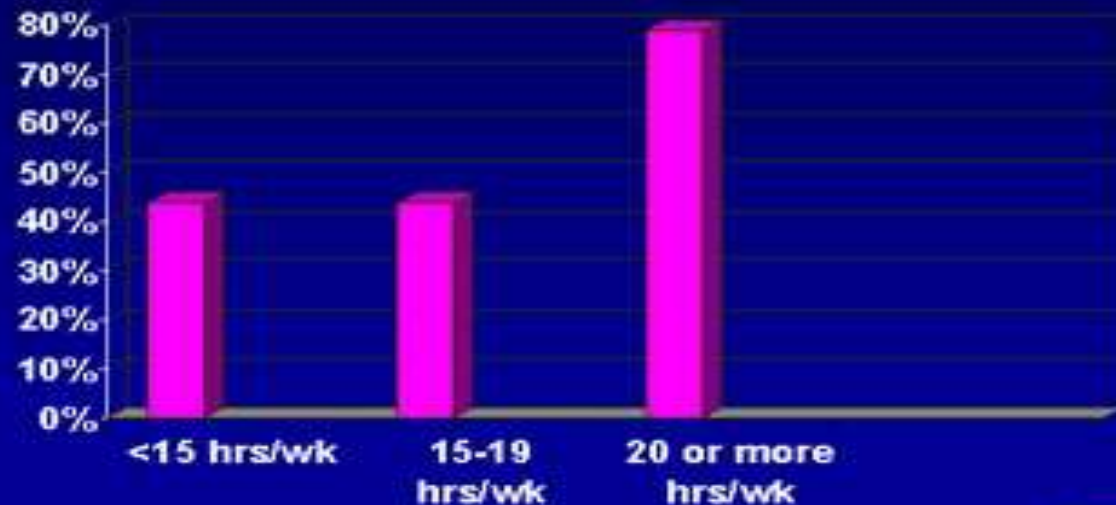
How to manage pregnant women while on dialysis?



- **Multidisciplinary team management.**
- Increase the duration of dialysis to at least 20 hours per week.
- Daily dialysis is probably the best choice.
- Lowering pre-dialysis BUN to less than 50 can increase baby survival up to 75-80%.

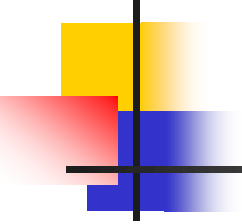
Daily dialysis and infant survival

Infant Survival vs Intensity of Dialysis



P<.05

How to manage pregnant women while on dialysis?

- 
-
- Tight control of **blood pressure**, which can be achieved with daily dialysis and antihypertensives.
 - ACE inhibitors should be avoided (teratogenic).
 - **Alfa methyl dopa (Aldomet) is the safest.**
 - **Diuretics need to be avoided or used with extreme caution.**

How to manage pregnant women while on dialysis?



- **Anemia**, requires increasing doses of iron supplements.
- Use of intravenous iron is controversial.



How to manage pregnant women while on dialysis?

- Fetal monitoring is mandatory.
- Anomaly scan at 18-20 weeks.
- Fetal biometry and BPP biweekly.
- Steroids to enhance lung maturity around 28 weeks.
- Delivery around 36-37 weeks by C/S in almost all cases.



Conclusion

- Pregnancy in patients on dialysis carries considerable risk to both mothers and babies.
- Pregnant patients on dialysis require dialysis time at least **20 hours/week**.
- Pregnant patients on dialysis require close monitoring by a **multidisciplinary team of experienced medical professionals**.



Thank you.

- El-Said Abdel-Hady.